IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Christian S. Nielsen	Examiner:	Johnson, Shevon Elizabeth
Serial No.	10/774,210	Group Art:	3766
Filing Date:	February 6, 2004	Docket No.:	P0010937.00
Title:	CAPACITORS FOR MEDICAL DEVICES		

DECLARATION UNDER 37 C.F.R. § 1.131 ANTEDATING A REFERENCE

I hereby declare the following:

1) I am currently and correctly named as an inventor in the pending patent application entitled "CAPACITORS FOR MEDICAL DEVICES", U.S. patent application serial number 10/774,210.

2) The invention disclosed within the above-referenced patent application was conceived of by me and the other named inventors before May 30, 2003.

3) An Invention Disclosure Form was completed that described the invention and was submitted to the Medtronic, Inc. legal department for consideration before May 30, 2003 (a redacted copy of said form is attached hereto).

4) I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 8/20/07

Anthony W. Rorvick

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Date: 10 Aug 2007

Christian S. Nielsen

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Date: 23 July 2007

Mark Edward Viste

Mark Edward Viste

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Christian S. Nielsen	Examiner:	Johnson, Shevon Elizabeth
Serial No.	10/774,210	Group Art:	3766
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Date: 7/31/07

John D. Norton

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Christian S. Nielsen	Examiner:	Johnson, Shevon Elizabeth
Serial No.	10/774,210	Group Art:	3766
Filing Date:	February 6, 2004	Docket No.:	P0010937.00
Title:	CAPACITORS FOR MEDICAL DEVICES		

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Date: July 23, 2007

Joachim Hossick-Schott

DISCLOSURE FILE

Status: O
Substatus: REV
SubDivision: LP003

Division: LP003
Attorney: GWM

Title: IMPROVED PACKAGING OF FLAT CAPACITORS FOR ICDs

Inventors: Nielsen, Christian S.
Hossick-Schott, Joachim
Norton, John D.
Rorvick, Anthony W.
Vis[illegible] Mark Edward

Submitted Date | Last Reviewed: | Next Reviev

Priority: X

Approved to Fi[illegible]

Related ID:

Outside Counsel:

Licensee: License File No.:

Other Information:

Minutes:

P10 937.00

Medtronic

INVENTION DISCLOSURE FORM

Please fill out this form as completely as possible. If the allotted space is not sufficient, use a separate sheet. Have your manager sign the form and forward it to the Patent Section of the Law Department. Please attach any drawings and technical descriptions that are available and assemble copies of the background articles, books, advertisements, etc., for use by your patent attorney. For a copy of this form on diskette or for information on network retrieval of this form, please call Systems Support at ext. 4111.

1. Inventor(s) Full name(s) Mail Stop Home Address (Include Zip Code)

(The following is a list of all inventors. Specific contributors are listed with each concept.)

Christian S. Nielsen	H136	582 Sykora Lane, River Falls, WI 54022
Joachim Hossick-Schott	H136	5330 Dupont Ave S, Minneapolis, MN 55419
John D. Norton	H136	2153 Violet Lane, New Brighton, MN 55112
Anthony Rorvick	H136	10641 Shady Oak Court N, Champlin, MN 55316
Mark Viste	H136	7243 Logan Ave N, Brooklyn Center, MN 55430

2. Title of Invention: Improved Packaging of Flat Capacitors for ICDs

3. How have others addressed this problem (List and attach any patents, books, articles, devices, Medtronic or competitor's products, or other background materials you used or which may be prior art)?

n

y an

4. The invention is not described in a Lab Notebook.

5. When was a device built which included the invention? It has not been built, yet.

Who built it?

Where is it?

Who has supporting documents?

Who witnessed tests? When and where?

6. Discuss the problems which the invention is designed to solve, referring to any prior devices of a similar nature with which you may be familiar.

Implantable Cardioverter-Defibrillators (ICDs) use high-voltage wet electrolytic capacitors for energy storage for use in delivering defibrillation therapy. Improvement of capacitor packaging efficiency results in minimization of capacitor volume, and therefore ICD volume, and is beneficial to the patient. Simplification of capacitor construction provides benefits in terms of ease and cost of manufacturing. This disclosure presents a method of capacitor construction that results in reduced capacitor size and/or simplified manufacturing.

7. State the advantages of the invention over presently-known devices, systems or processes.

- *Capacitor packaging efficiency.* The invention will allow improved capacitor packaging efficiency in the following ways:

  1. Reduced volume of separator material.
  2. Reduced volume of encasement material through the use of the anode as a structural member.
  3. Reduced margin space between the electrode and case.
  4. Reduce number of electrodes in the capacitor.
  5. Reduce volume of electrolyte required in the capacitor.
  6. Simplified separator wrapping on electrodes reduces edge margin to case spacing.
  7. Possible use of nonconductive case material, removing need for external insulating material and reducing electrode to case margins.
  8. Headspace reduction.

- *Manufacturability.* The invention will allow improved capacitor manufacturability in the following ways:

  1. Simplification of separator design.
  2. Electrode creation within the case.
  3. Use of a single cathode (reduced number of electrodes).
  4. Simplified weld technique (weld guard, polymer separator).
  5. No welding required for electrode in direct contact with case.
  6. Headspace simplification.

8. List all known and other possible uses for the invention.

Wet electrolytic capacitors.
Implantable cardioverter-defibrillators.
Non-implantable cardioverter-defibrillators.
Other devices or systems which use wet electrolytic capacitors.
Other electrochemical cells.

9. Specifically describe the invention and its operation. You may use and attach copies of sketches, prints, photographs and illustrations which should be signed, witnessed and dated. Use numbers and descriptive names in descriptions and drawings.

The preferred embodiment of the invention is shown in the attached figure. A pair of Ta/Ta_2O_5 anodes are each formed by pressing Ta powder into a very thin tantalum half-shell case to form a porous slug in electrical contact with the case. The press used to create the anodes creates a series of tunnels in the anode to aid in heat dissipation during the forming process and reduce ESR during operation. The anodes are subsequently sintered, and a thin Ta_2O_5 film is electrochemically formed on the surface that acts as the anode dielectric.

One of the half-shells is deeper than the other and contains a glass-metal seal feedthrough that is used to pass the cathode connection outside the case. It also contains a fill port to be used for electrolyte filling. The anodes add structural support to the case.

The cathode is a titanium substrate coated on each side with a porous coating of hydrous RuO_2. This cathode is bagged in a porous polypropylene separator, and electrically connected to the feedthrough.

During assembly, the two half-shells are placed together with the deeper shell overlapping the more shallow shell and the two are laser welded together. The capacitor is then filled with a sulfuric acid/glycol base electrolyte and aged to fully form and repair the dielectric. The capacitor is then re-filled with electrolyte and the fillport sealed to form a hermetically sealed capacitor.

One or more of these capacitors are used to form a capacitor assembly in an ICD. The ICD battery and a charging circuit are used to charge the capacitor(s) when determined by the device circuitry. The capacitor(s) is/are used to deliver high-voltage therapy when determined by the device circuitry.

The capacitor assembly described above results in increased packaging efficiency from ~70% to ~85%, and a resultant decrease in assembly volume of approximately 0.75 cc.

10. List all features of the invention that are believed to be novel.

See (7) above in addition to the following:

a) Production of an electrode with a zero-tolerance fit for the encasement shell. (Inventor: Nielsen)
b) Use of a case positive capacitor design in an ICD. (Inventor: Nielsen)
c) Use of a bipolar case capacitor design in an ICD. (Inventor: Hossick-Schott)
d) Use of a sandwiched electrode design in which all cathodes are sandwiched between anodes, but not all anodes are sandwiched between cathodes, and in which the outermost electrodes are anodes which may or may not be in intimate contact with the case. (Could be either case positive or negative.) (Inventors: Rorvick, Norton, Nielsen)
    1) Subsequently package the capacitor in a foil pack.
    2) Subsequently package the capacitor in a sealed polymer bag.
    3) Subsequently seal an assembly of one or more packs or bags in a single metal case, with one or more electrode feedthroughs.
e) Use of an electrode as a structural member, allowing reduced encasement material. (Inventors: Rorvick, Norton)
f) Coating of a non-permeable film on the exterior of outermost electrode to function as encasement. (Inventor: Norton)
g) Pressing of an anode slug electrode within the encasement shell. (Inventor: Rorvick)
    1) Drilling or pressing holes in the anode slug to reduce heating during anodizing and to reduce ESR during operation (as described in Invention Disclosure P-10579.00)
    2) Use of additional (removable or permanent) material for encasement and/or electrode fixturing during sintering and/or formation to control shrinkage/expansion and shape deformation.
h) Use of a weld ring containing one or more electrical feedthroughs to be connected to one or more electrodes, either anode or cathode, and used to mechanically connect two sides of the capacitor case. (Inventors: Norton)
i) Use of one case which is deeper than the other to allow for feedthrough (electrode nested in the other case may stick out beyond the height of the case). (Inventor: Nielsen)

j) Use of electrode wires or other metal forms introduced into the anode interior to enhance structural stability. (Inventor: Viste)
   1) Pressed with the slug.
   2) Added externally or within the holes described in (e) above.

k) The implementation of any of the above in conjunction with or without the use of a glass-metal seal feedthrough.

l) The implementation of any of the above in conjunction with a capacitor constructed of a metal similar or dissimilar to either of the electrode metals.

11. Sale or Publication (Needed to establish the date of any printed publication, public use or sale, since no U.S. patent application may be filed after one year from such date.)

a. If a device has been offered, or will be offered for sale, or used for profit or otherwise publicly disclosed--state when and to whom delivered and how used?

N/A

b. Has a printed description of this invention been made available to persons outside the company? How and when and was use restricted? (e.g., licensing agreement, non-disclosure agreement, proprietary legends, etc.)

No.

12. Inventor(s) Signature(s) (**REQUIRED**):

Signature

Mark Viste

Manager's Comments

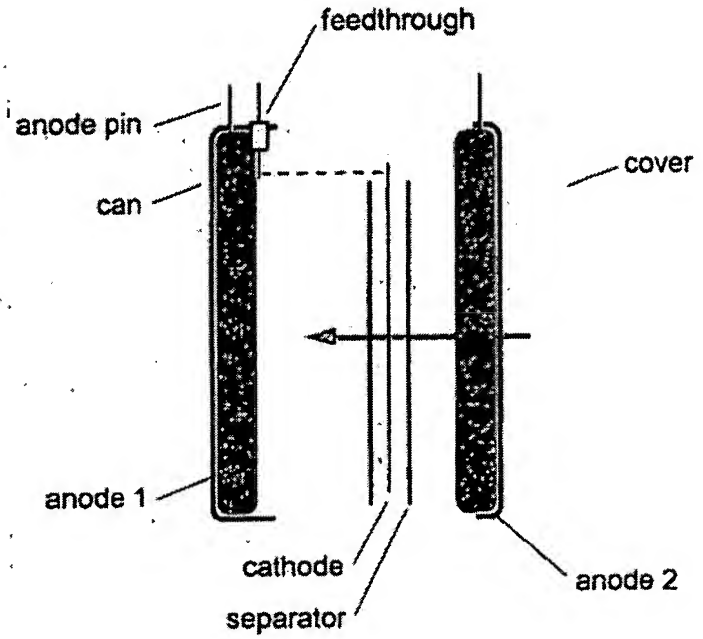
How is this invention important to your products, plans or goals?

Significant importance for future tachy devices

Manager's Signature (**REQUIRED**)

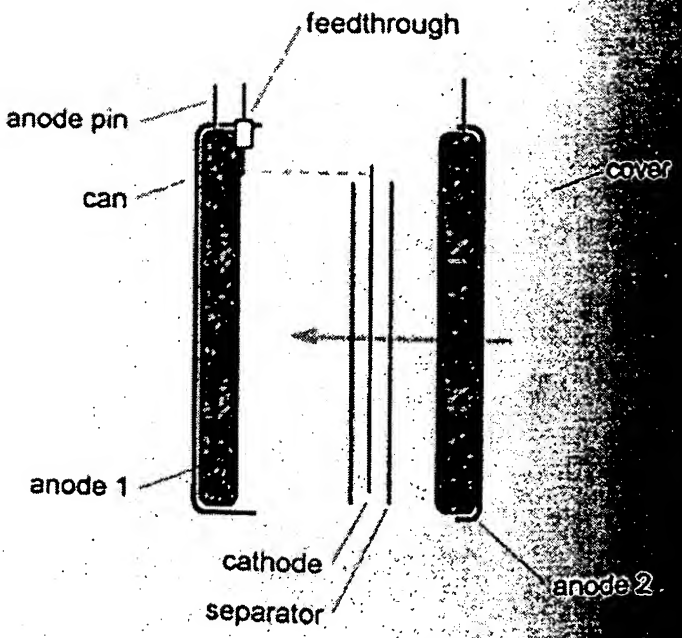
(Manager: Please forward to Patent Section of Law Department upon completion of your review.)

Case Positive with Center Cathode Concept



page 14.5

Case Positive with Center Cathode Concept

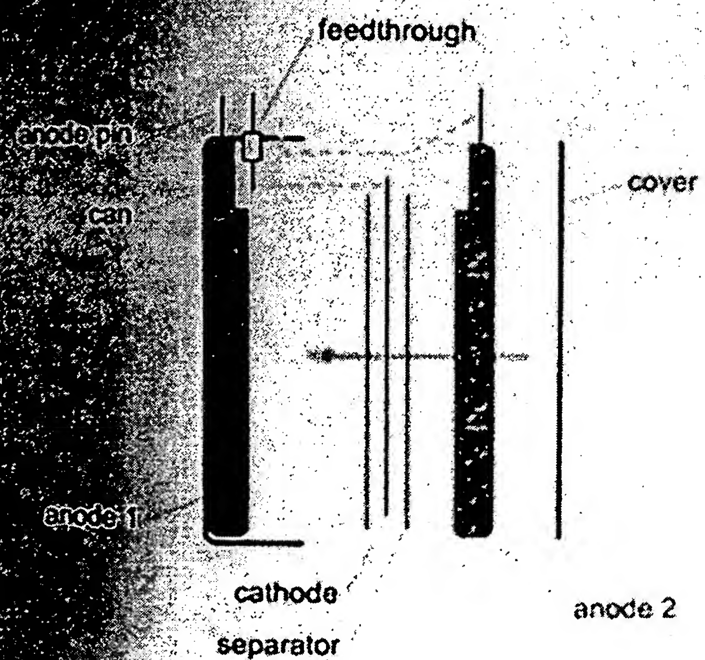


Advance Anvil packaging.

Project No. T0149
Book No. 10813

new 1 Example: case positive design.)

Case Positive with Center Cathode Concept



A method for increasing the packaging eff. was thought off here.

Estimated volumes to date: 1.34 cc package
.858 cc slug

SEE ALSO CENTRE CATHODE TESTING USING ... SYSTEM page 46 Book 10813

Witnessed & Understood by me | Date | Invented by | Recorded by

TITLE Center Cathode tests. Project No. T0149 Book No. 10813

Page No. Al(?)

Paul,

GEM II

anode foil

part No. 133187008

Rev B

LOT # 570605

LYDIA

This is the anode foil used in the so-called "iny" and "outy" experiment

Glass plate capacitors were made placing a single cathode between two anode (Marginal) subs as well as the traditional cathode on either side of sub.

Read & Understood by me. | Date | Invented by | Recorded by [signature]